Patent claims

1. Soil compacting system, having
- a mobile, steerable vibration plate (3), and
- a control device (5);
the control device (5) having:
- a surface definition device (6) for the definition by an operator of a surface (1) to be compacted and of the associated surface boundaries (2);
- a position detection device (18) for detecting the current position of the vibration plate (3) at least in the vicinity of the surface boundaries (2);
- a motion controller (8a; 8b) for changing a direction of travel by predetermining a target value for a traveling movement of the vibration plate (3), such that the vibration plate (3) does not cross the respective surface boundary (2), but rather continues its travel within the surface (1).

2. Soil compacting system according to Claim 1, **characterized in that**
- the position detection device (18) is fashioned at least for the detection of an approach of the vibration plate (3) to one of the surface boundaries (2);
- the direction of travel can be changed by the motion controller (8a; 8b) if the position detection device (18) determines an approach to the surface boundary (2).

3. Soil compacting system according to Claim 2, **characterized in that** the surface definition device (18) has a device for the mechanical, optical, magnetic, inductive, or capacitive identification of the surface boundaries (2).

4. Soil compacting system according to Claim 3, **characterized in that** the device for mechanical identification has tape or wire means that can be stretched along the surface

boundaries (2).

5. Soil compacting system according to Claim 3, **characterized in that** the device for optical identification has coloring agents that can be applied to the soil along the surface boundaries.

6. Soil compacting system according to Claim 3, **characterized in that** the device for optical identification has a photoelectric barrier.

7. Soil compacting system according to one of Claims 1 to 6, **characterized in that** the motion controller (8a; 8b) effects a change of the direction of travel from the original direction of travel with a predetermined angle (α) that remains constant during the entire compacting process or with angles that change during the compacting process and that are selected randomly.

8. Soil compacting system according to Claim 1, **characterized in that** the control device has:
- a path planning device (7) for setting a predetermination for a travel path (4) on the basis of the defined surface (1) in such a way that the vibration plate (3) travels over the surface (1) to be compacted completely at least once while adhering to the predetermined travel path;
- the position detection device (18) being fashioned for the detection of the current position of the vibration plate (3) within the surface boundaries (2), and
- the motion controller (8a, 8b) being fashioned for the predetermination of a target value for a travel motion of the vibration plate (3) based on a comparison of the current position with the predetermined travel path, in such a way that the vibration plate (3) follows the predetermined travel path.

9. Soil compacting system according to Claim 8, **characterized in that** the surface definition device (6) and/or the position detection device (18) has a coordinate detection device for determining absolute geographical locus coordinates of its location.

10. Soil compacting system according to Claim 8 or 9, **characterized in that** the surface definition device (6) has a memory device containing geographical locus information for the region of the surface (1) that is to be compacted.

11. Soil compacting system according to one of Claims 8 to 10, **characterized in that** the surface boundaries (2) are capable of being defined by absolute locus coordinates.

12. Soil compacting system according to one of Claims 8 to 11, **characterized in that** the predetermination of the travel path by the path planning device (7) is capable of being defined in the form of absolute or relative geographical locus coordinates.

13. Soil compacting system according to one of Claims 8 to 12, **characterized in that** the path planning device (7) has mathematical algorithms for path-optimized and/or time-optimized path planning.

14. Soil compacting system according to one of Claims 8 to 13, **characterized in that** at least a part of the components of the control device (5), in particular the surface definition device (6), the motion controller (8a), and/or the path planning device (7), is situated spatially separate from the vibration plate (3).

15. Soil compacting system according to one of Claims 8 to 14, **characterized in that** the surface definition device (6) is situated spatially separate from the vibration plate (3), and that data can be transmitted between the surface definition device (6) and the vibration plate (3) in wireless fashion, in particular via radio, infrared, or laser.

16. Soil compacting system according to one of Claims 1 to 15, **characterized in that** an input

device (9) for manually modifying the target value predetermined by the motion controller (8a; 8b) is provided spatially separate from the vibration plate (3), and is coupled thereto via a radio, laser, or infrared path.

17. Soil compacting system according to one of Claims 1 to 16, **characterized in that** the position detection device (18) is coupled to a memory device for storing data concerning the positions reached by the vibration plate (3).

18. Soil compacting system according to one of Claims 1 to 17, **characterized by** an evaluation device that is coupled to the surface definition device (6) and to the position detection device (18), and that has a display (12) for the graphic representation of the predetermined surface boundaries (2) and of the surface already compacted at a given time by the vibration plate (3).

19. Soil compacting system according to one of Claims 8 to 18, **characterized in that**
- a compaction result detection device is provided for detecting the actual state of compaction of the compacted soil;
- the compaction result detection device is coupled to the path planning device (7) for the communication of information relating to the actual state of compaction; and that
- the path planning device (7) is fashioned for the definition of the predetermination of the travel path (4), taking into account the actual state of compaction.

20. Soil compacting system according to Claim 19, **characterized in that**
- in the path planning device (7), the actual state of compaction can be compared with a predetermined target state of compaction;
- the travel path (4) can be predetermined by the path planning device (7) in such a way that soil surfaces in which the actual state of compaction exceeds the target state of compaction, so that a sufficient compaction is already present, are no longer traveled over by the vibration plate (3).

21. Soil compacting system according to one of Claims 1 to 20, **characterized in that** the vibration plate (3) has:
- a drive mechanism (16) for producing an advance movement;
- a steering device (16) for producing a yaw moment about a vertical axle (29) of the vibration plate (3);
- a movement detection device for detecting an actual value for the travel movement; and
- a travel regulation device (15) that can be charged with the actual value and the target value predetermined by the motion controller, for controlling the steering device and/or the drive mechanism in such a way that a control deviation formed by the difference between the actual value and the target value is minimal.

22. Soil compacting system according to Claim 21, **characterized in that** the drive mechanism has at least one vibration-exciting device (16) having two shafts (25, 26) that are parallel to one another and that can be rotated in opposite directions, each of which bears at least one imbalance mass, and whose phase position to one another can be adjusted.

23. Soil compacting system according to Claim 21 or 22, **characterized in that** on at least one shaft (25, 26) of the vibration-exciting device (16) two imbalance masses are situated so as to be axially offset to one another, and that the steering device (16) is fashioned for the adjustment of the phase position of the two imbalance masses.

24. Soil compacting system according to one of Claims 21 to 23, **characterized in that** the drive mechanism and the steering device are formed by a system of a plurality of vibration-exciting devices (27, 28; 30) that are held stationary relative to one another, the vibration-exciting devices (27, 28; 30) each having two shafts that are parallel to one another and that can be rotated in opposite directions, each shaft bearing at least one imbalance mass, the phase position of the

shafts being adjustable, an advance movement being producible in a direction of advance by each of the vibration-exciting devices (27, 28; 30).

25. Soil compacting system according to one of Claims 21 to 24, **characterized in that** the direction of advance of at least one (30) of the vibration-exciting devices differs from that of the others (27, 28).

26. Soil compacting system according to one of Claims 21 to 25, **characterized in that** a soil contact plate (31) charged by the vibration-exciting device or devices has an essentially circular outline.

27. Method for automated soil compacting, having the steps:
- defining of surface boundaries (2) of a surface (1) to be compacted, using a surface definition device (6);
- automatic travel of a vibration plate (3) within the surface boundaries (2), essentially in a straight line;
- detection of an approach of the vibration plate (3) to one of the surface boundaries (2);
- automatic modification of the direction of travel of the vibration plate (3) in such a way that the vibration plate (3) does not cross the respective surface boundary (2), but rather continues its travel within the surface (1).

28. Method for automated soil compacting, having the steps:
- defining of surface boundaries of a surface (1) to be compacted, and storing of data representing the surface boundaries (2) in a surface definition device (6);
- planning of a predetermination for a travel path (4) in such a way that a vibration plate (3) travels completely over the surface (1) to be compacted at least once, while adhering to the predetermined travel path;

- automatic travel of the vibration plate (3) along the predetermined travel path.

29. Method according to Claim 28, **characterized in that** the automatic travel comprises the following steps:
- detection of the current position of the vibration plate (3);
- comparison of the current position with the predetermined travel path;
- automatic travel and steering of the vibration plate (3) in such a way that the vibration plate (3) follows the predetermined travel path.

30. Method according to Claim 29, **characterized by** the steps:
- continuous detection of the actual state of compaction of the compacted soil;
- comparison of the actual state of compaction with a target state of compaction;
- compensation of the predetermined travel path in such a way that areas of the soil in which the actual state of compaction is greater than the target state of compaction are no longer traveled over by the vibration plate (3).

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